



MONASH UNIVERSITY - ACER
CENTRE FOR THE ECONOMICS OF EDUCATION AND TRAINING

**Price measures in education and training:
opening a discussion**

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CEET hopes to develop further papers on this topic and would welcome comments and notes on the current paper

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- expenditure on education and training
- measures of prices in education and training
- the costs of vocational programs in schools, in TAFE and in industry

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Executive summary

This paper examines the main purposes for undertaking price deflation and in particular distinguishes between price deflation in budgeting and in performance reporting.

Budgeting

Governments base their budgets for education and training on policy, which only occasionally requires the exact maintenance of standards of provision of personnel and other resources. If governments **do** wish to maintain existing standards of provision, then they require price index numbers that reflect the costs of the personnel and other resources. But if there is no explicit commitment to maintaining a current standard then alternative approaches can be and are used. However, for transparency it is desirable that information should also be available on how the costs of inputs have changed so that the effects of policy changes can be distinguished from price changes.

National authorities in fact use a range of different methods to adjust educational budgets. The results can vary considerably across the different sectors. This can be illustrated by the adjustments made from 1997 to 2002 by the Commonwealth. University operating grants were adjusted by a Cost Adjustment Factor (CAF) that increased by 10 per cent. In contrast, recurrent funds for government and non-government schools were increased in line with a measure of Average Government School Recurrent Cost (AGSRC) that rose by over 30 per cent.

Performance reporting

In performance reporting it is usual to seek to compare inputs with outputs. It is necessary to have both inputs and outputs expressed free of price changes. In the main sectors of education non-monetary measures of output can be used—such as hours of training in vocational education and training (VET) or equivalent full-time students (EFTSU) in higher education. There is no problem with price changes regarding those outputs since they are not measured in monetary terms—there are important questions about the changes in the quality of outputs over time but they are not the subject of this paper.

Inputs can also be measured in non-monetary terms such as number of teachers. A common measure used to compare inputs and outputs is the teacher-student ratio. But for measures of all the inputs the usual measure is expenditure on the inputs. To compare inputs over time it is necessary to deflate the expenditure on the inputs by a measure of prices that reflects the costs of the inputs, e.g. the cost of teachers and of non-teacher resources. The best measure of wage costs in the education sector is the Wage Cost Index (WCI) for Education. Various indexes may be appropriate for the non-wage component of costs though the non-farm GDP implicit price deflator (NFGDP deflator) may be a reasonable approximation for such costs.

This is in contrast with the common current practice (e.g. by ANTA and the Productivity Commission), which is to use the NFGDP deflator or a similar economy wide measure for both the wage component and the non-wage components of costs in the education sectors. The NFGDP deflator is not an appropriate measure where wages make up a large proportion of costs, as is the case in education. There are often

considerable differences over time between increases in measures of overall inflation such as the NFGDP deflator and increases in measures of costs in labour intensive areas such as education and training. The differences occur because, in the overall economy, prices of goods and services increase by less than wages—productivity increases allow at least part of the wage increases to be absorbed.

VET

Particular consideration is given to the VET sector. An overall index comprising 69.5 per cent Wage Cost Index (WCI) for the Education industry and 30.5 per cent of a 'VET non-wage index' is proposed for use in performance reporting in the VET sector. The percentage shares are based on analysis of the wages and non-wage components in the total expenses in the VET sector over five years.

The use of the WCI for the wage component needs further consideration. On the basis of a comparison of changes in the WCI with the changes in the agreed salaries of TAFE teachers in recent years, the WCI seems a reasonable measure of wage changes in VET at this stage.

The index for the non-wage expenses in the VET sector has been constructed for this study from relevant components of the Consumer Price Index (CPI) and some Producer Price Indexes. The internal components vary, some such as computers and insurance quite considerably. Overall, this non-wage component has moved closely in line with the NFGDP deflator in the last five years but has more apparent validity.

Introduction¹

The purpose of this project was to review the use of price measures in education and training and to consider the types of measures that could be applied.

If we want to compare levels of expenditure at different periods of time it is necessary to account for changes in price. This usually involves the use of price index numbers. It does make a difference which price index number is used. For example the implicit measure of price change for the whole Gross Domestic Product increased 12 per cent from 1997 to 2002. The Consumer Price Index (CPI) increased by 15 per cent. The Wage Cost Index for Education increased by 19 per cent. It is not the case that one of them is correct. What is the appropriate type of index to use depends on the purpose.

Hence the purposes for which the deflation is to be undertaken must be considered. This is undertaken in section 1. The main purposes in which estimates with account taken of price change might be needed can be grouped as:

- preparation of budget estimates and planning;
- accountability for efficient and equitable use of funds; and
- research involving consideration of resources.

Section 2 is a short overview of the major forms of price indexes. In essence price indexes measure the change in the cost of a representative basket or shopping trolley of goods and services. The issues concern

- what is in the basket?
- since there are changes in patterns of resource use, should the trolley be representative of the first time period or the last? and
- can we get good measures of price changes, especially when quality changes are occurring?

Section 3 reports on the current use made by national authorities of measures of price changes in relation to education expenditure. The recent and current uses are considered against the purposes discussed in section 1.

Section 4 more critically reviews the current use of price deflators with a view to the most appropriate index for the particular purpose. However the extent to which new forms of deflation can be undertaken depends on the current and future availability of suitable price measures.

Section 5 considers price measures for the wage and non-wage components of VET expenses and their limitations for the purposes specified. Section 6 provides some concluding comments.

¹ Warm thanks to Mike Long, Chris Selby Smith and to several members of the Australian Bureau of Statistics for comments. The supply of data on TAFE teachers' salaries by the Australian Education Union is much appreciated. None of the above bear responsibility for the analysis or interpretation in the paper.

1. Purposes of deflation for price change

There are several contexts in which price measures are needed and the context will affect the type of measure of price change that is needed. The main ones, which will be considered further in the paper, are the budget and planning process and reporting and accountability procedures. Research uses cover both of these usually over a longer time period and if possible in greater detail.

Budget and planning

The budget context includes the processes of determining priorities for the delivery of services, distribution of funds to operational units, purchase of services from internal and external providers, allocation of funds within a fixed quantum, funding-up submissions, provision of grants, and all related budget activities. In the modern budget context, particularly in the public sector, there are strong emphases on the concepts of maintenance of effort and maintenance of funding levels. These concepts are prominent in the concerns of funding providers and service providers respectively and are significant reasons for the development of price deflators.

There has been a concern in areas such as education and health that particular norms or standards be maintained. This led to the use of price measures of the cost of the major inputs (teachers, other personnel and other resources) being used to adjust the annual budget. This approach has not been followed so precisely in recent years².

Planning includes the development of financial and funding scenarios associated with alternative policy options, the evaluation of those options and the selection of preferred approaches. Although closely related to the budget context it differs in not being directly involved in the allocation of funds. It is also concerned with investigation of ‘what if’ funding questions based on existing and past situations.

Planners need to project into the near future ‘given what has happened to date, if funding remains static/increases/decreases...’ In particular, contingency planning and scenario development require this information to avoid the often misleading trends suggested by current price information.

Accountability and reporting context

This encompasses all those activities involved with the provision of information to allow judgements, formative or summative, about the worth or success of organisations or operations. This is performance accountability rather than financial accountability in the strict sense. Nevertheless, financial matters almost invariably form a critical component of the information required in this context. The information will be required in simple financial form, such as appropriations and other forms of revenue, or in combined forms such as expenditure per student or per student contact hour.

² A debate about the issues recently occurred in South Africa where the national Treasury concluded ‘A bottom up approach is not an appropriate way to determine budgetary priorities which require political judgement in making difficult trade-offs’ (South Africa Treasury 2001)

A recent phenomenon in this context is the increasing use of performance indicators. These might have a variety names such as Key Performance Indicators, Critical Success Factors, Key Outputs, Critical Outcomes, or just simply Indicators. Their use is associated with the growing adoption of strategic planning approaches by government and semi-government organisations. Much of their attraction appears to be their abbreviated reporting format, but as in all accountability processes, it is the quality of the information reported that is critical, not the format of the report.

Whether as an indicator or in a more extended format, financial information in a performance accountability context is most useful when it is part of a series capable of showing trends or tendencies over a period of time. To be optimally useful, time series financial information must be adjusted to compensate for price movements.

Research context

When financial questions are being investigated in the research context, greater demands will be placed on price deflator series. Because of the effects of cumulative errors in linked series, longer time series of price deflators will need to have greater precision than would be acceptable over shorter periods. Similarly, comparisons of time series financial information from widely differing environments will require careful use of price deflators appropriate to the environments.

2. Major forms of price indexes

The ABS provides detailed discussion in many documents of the nature of price and volume indexes and their particular uses.

To get a measure of price changes from one period to the next we need to be able to control for volume changes, and vice versa for prices to get a measure of volume changes. This is explained using algebra in Box 1.

There are two main forms of indexes of price change. We can choose a 'basket of commodities' at time t and measure its value at time t compared with its value at some later time such as $t+1$. Alternatively we can choose the basket of commodities at time $t+1$ and compare it to its value at earlier periods. The index found from the first approach is a Laspeyres Index. The second approach gives a Paasche Index.

The Laspeyres Index tends to give larger values than the Paasche. The reason is that in most cases there is a tendency to substitute those commodities that become relatively cheaper for those that become dearer. The second year's basket of commodities will have increased less in total value than the first year's basket.

The problem can be reduced by the use of indexes combining the two approaches (such as the Fisher Index). However the problem is of substance usually only when the basket of commodities is kept constant over a considerable period of time. In the National Accounts the ABS now updates its 'basket' every year to the year immediately prior to the one under consideration (ABS 5216.0). In the comparison of this year's output with the previous year's the price (and volume) measures are much less affected by compositional changes than are comparisons over a longer time period.

Box 1. Defining indexes

The total value of any transaction is the product of the number of items involved and their prices. If there are different commodities or services in the transaction then its overall value will be the sum of the products of the numbers of items of each service or commodity and their respective prices. That is, $\sum p_i q_i$, where \sum is the sum of all products $p_i q_i$ of the price p_i and the quantity of goods or services q_i for the i^{th} member of the set of transactions.

If we compare the total transactions for two different periods, we are comparing $\sum p_{i1} q_{i1}$ with $\sum p_{i2} q_{i2}$. Between one period and the next it is highly likely that the price per item in the i^{th} transaction will have changed, and so too will the quantity of the item. That is p_{i1} will not equal p_{i2} and q_{i1} will not equal q_{i2} .

The ratio p_{i2}/p_{i1} is called the price relative and the ratio q_{i2}/q_{i1} is called the quantity relative. They show the relative change in price or quantity from one transaction period to the next for the goods or services in question.

The average of the ratios p_{i2}/p_{i1} across all transactions will provide a measure of the average price change between the two periods and the average of the ratios q_{i2}/q_{i1} will provide a measure of the average volume change. The averages are, in effect, a price and a volume index respectively.

3. Current methods of price adjustment in education

This section considers the current uses of price measures in national funding and reporting. It deals with publicly available processes. There is considerable use of price measures within both state and Commonwealth agencies that is not publicly reported.

Commonwealth Treasury

The Commonwealth Treasury in its annual Budget presents forward estimates of expenses by function with explicit projections of price increases. It clarifies its meaning:

- ‘real’ means adjusted for the effect of inflation; and
- real growth in expenses is calculated with the non-farm gross domestic product deflator. (Australian Treasury 2003, Budget Paper No 1, p.iii)

For example, as shown in Table 1 Commonwealth education expenses are estimated to increase from \$13.2 billion in 2003-04 to \$15.7 billion in 2006-07. This is an increase in nominal terms of 19 per cent but the increase is 12 per cent *in real terms* (Budget Statement 6 pp.6-19) as the non-farm GDP implicit price deflator (NFGDP deflator) is projected to grow 2 per cent per annum or about 6 per cent in this period.

It can be noted here that the projected growth in vocational and other education funding just keeps pace with inflation whereas non-government schools and higher education run far ahead. These funding allocations made to the different sectors are the result of policy changes but also of different methods of taking account of price or cost changes. These price or cost measures will be outlined in the discussion of the activities of the Department of Education, Science and Training (DEST) and DFACS the Department of Family and Community Services (DFACS) below.

Table 1. Summary of Commonwealth education expenses, nominal prices, \$ million, actual 2002-03 and projected to 2006-07

	2002-03	2003-04	2004-05	2005-06	2006-07	Change 2003-04 to 2006-07
	\$m	\$m	\$m	\$m	\$m	%
Higher education	4,162	4,314	4,574	4,902	5,282	22
Vocational and other education	1,360	1,452	1,492	1,525	1,539	6
<i>Non-government schools</i>	3,975	4,373	4,712	5,062	5,425	24
<i>Government schools</i>	2,140	2,262	2,389	2,515	2,647	17
Schools	6,115	6,636	7,101	7,576	8,072	22
Student assistance	578	622	648	655	668	7
General administration	2	2	2	2	2	0
School Education –specific funding	126	134	112	116	111	-17
Total education	12,342	13,160	13,928	14,776	15,674	19

Source: Australian Treasury, Budget Paper No 1, Statement No 6, Education

An important issue in the following discussion is the difference between general price measures such as the Non-farm GDP deflator or the Consumer Price Index (CPI) on the one hand and measures of wages which in general rise by about 1.5 per cent more per annum, roughly the level of productivity increase in the economy. Box 2 provides a brief description of some of the main measures of prices used by Treasury but several further measures will be discussed below.

Box 2. Notes on some major price indexes/deflators used by Treasury

Non-farm GDP Deflator (projected at 2% per annum)

The implicit NFGDP deflator is the current price value of the non-farm product divided by its chain volume measure (its 'real' counterpart). It is a measure of the average change in prices across the whole non-farm sector. Gross non-farm product is the sum of the product of all industries excluding the product of agriculture and services to agriculture. It makes up nearly 98 per cent of GDP. As a result the NFGDP Deflator is only marginally different to the deflator for the GDP

CPI (projected at 2.5 % per annum³)

The CPI is a general measure of price inflation for the household sector as a whole. It is a Laspeyres index based on a fixed collection of items. The index is revised every five years and its current weights are based on the patterns of expenditure derived from the 1998-99 Household Expenditure Survey (ABS 6461.0 p.48). Its main elements are housing, food, transportation, recreation, household furnishings, supplies and services, alcohol and tobacco, clothing and footwear, and health.

The Commonwealth Treasury also makes use of an underlying rate of inflation which is made up of elements of the CPI: 'Treasury's underlying rate is calculated by removing from the CPI those items whose prices are directly influenced by highly volatile, seasonal or policy factors' (Parliamentary Library 2001).

Wages (projected at 3.75% per annum)

The Wages measure used by the Commonwealth Treasury is derived from the National Accounts (ABS 5204.0, 5206.0). It is based on the estimated compensation of non-farm employees divided by hours worked.

DEST

DEST is responsible for developing the Commonwealth's proposed funding for schools and higher education and the Commonwealth's commitments under the ANTA agreement. These proposals are based on policy changes and some consideration of price changes.

³ Further details on the CPI are included in Appendix 1.

Higher education

Operating grants

From 1996 the annual operating grants for universities have been adjusted by a Higher Education Cost Adjustment Factor (CAF). Salary costs were notionally seen by DEST to constitute 75 per cent of grants (the actual share is smaller than this). This component of the CAF is based on the Safety Net Adjustment (SNA) as determined by the Australian Industrial Relations Commission. Non-salary costs notionally constitute 25 per cent of grants and are indexed using the Consumer Price Index (CPI) (DEST 2003a).

The Safety Net Adjustment of the Australian Industrial Relations Commission is aimed at low paid workers and in 2002 it was increased by \$18 per week. In relation to average wages and salaries in higher education this amounted to about 1.9 per cent. This can be compared with the estimated increase in the hourly rates of pay in the whole education sector of 3.8 per cent in 2001-02 and 4.4 per cent in 2002-03 (ABS 6345.0 2003, p.9). In 2003 the safety net adjustment was increased by \$17 for the lowest paid workers and by \$15 for persons earning \$731.80.

The CAF is not a measure of cost increases in universities:

The Higher Education Cost Adjustment Factor (CAF) is an index reflecting the contribution the Commonwealth makes towards increases in the operating costs of higher education institutions. The CAF does not measure actual price rises but the Commonwealth's contribution towards annual increases in salary and non-salary costs. (DEST 2003a p.117).

HECS and PELS

The Higher Education Contribution Scheme (HECS) applies to most undergraduate Australian students and some postgraduate students. Under the scheme most students choose to defer payment of fees with repayments to be made when their income exceeds a specified level. The charges made to students under the HECS scheme and their accumulated debt are adjusted annually by the CPI. The debt under the Postgraduate Education Loans Scheme (PELS) is treated the same way.

Schools

From 1993 recurrent funds provided to government and non-government schools by the Commonwealth under the State Grants (Primary and Secondary Education Assistance) Act have been supplemented annually by the movement in a measure of the resources provided by States and Territories to government schools⁴. The measure used is the Average Government School Recurrent Cost (AGSRC). This is based on the expenditure per student from government funds estimated annually in the

⁴ The Commonwealth until the early 1990s, in addition to any policy changes, used to adjust its funding to government and non-government schools by reference to a Schools Price Index. This index was originally estimated by the Schools Commission but was subsequently prepared by ABS. ABS has continued to prepare what it calls an Education Cost Index but this is not published and not used from 1993 by DEST for adjustment of school funding.

MCEETYA National Schools Statistics Collection (2003) (see also DEST 2003b, p.18 and p.190.)⁵ The General Recurrent Grants paid annually to non-government schools under the States Grants (Primary and Secondary Education Assistance) Act have been calculated as a proportion (determined by SES score) of the AGSRC since 2001 (see DEST 2003b p.168.)

Commonwealth grants for capital purposes are adjusted by a Building Price Index based on data supplied by ABS (DEST 2003b, p.190)⁶.

Funding for Indigenous Education Strategic Initiatives Programme (IESIP) is adjusted by a similar measure to the CAF used for university operating grants: an index comprising 75 per cent Safety Net Adjustment and 25 per cent of the Treasury Measurement of Underlying Inflation (which is very similar to the CPI).

Those remaining DEST school programmes which are funded under Annual Appropriation Acts are subject to various treatments: no indexation for set sum grants; the use of the NFGDP deflator for some, and the measure based on the Safety Net Adjustment and Underlying Inflation for some (DEST 2003b p.20).

ANTA Agreement

The ANTA Agreement between the Commonwealth and the States and Territories includes commitment of Commonwealth funds for vocational education and training. Under the Vocational Education and Training Funding Amendment Bill funds have been adjusted for price movements reflected in Treasury Indexes.

The proposals from the Commonwealth for the period 2004 to 2006 include estimated supplementation each year of about 2.3 per cent per annum (Kempner 2003), a little higher than the projected increase in the NFGDP deflator.

ABSTUDY and AUSTUDY and other student support

ABSTUDY is the main student support scheme for Indigenous students. AUSTUDY is the student assistance scheme for other students aged 24 and over—Youth Allowance applies to younger students. The CPI is used to make annual adjustments.

DFACS

Youth Allowance student assistance is payable to full-time (with some exceptions) students 16 and over, subject to various tests of means and participation in education or training. The value of the Youth Allowance is adjusted annually by the CPI.

⁵ Total government school recurrent costs less redundancy payments less Commonwealth grants to schools less, less government school share of Commonwealth funded joint programmes and of IESIP.

⁶ The Building Price Index used by DEST is calculated as: 40% Wage Cost Index (6345.0) for total hourly rates of pay, public and private, for the construction industry; plus 60% Producer Price Indexes (6427.0) for materials used in building other than house building, weighted average of six state capital cities.

ANTA

The previous examples have been in a budgetary context. ANTA makes use of price indexes for accountability. Key Performance Measure 6 (KPM6) reported in *ANTA Annual National Report of the Australian Vocational Education and Training System 2002* Volume 3 is a measure of the efficiency of producing publicly funded VET skill outputs. The estimates for several years are provided in 2002 prices by adjusting government recurrent expenditure on VET by the NFGDP deflator (ANTA 2003, pp.163-66).

Productivity Commission

The annual financial year estimates of state and territory expenditures on government schools are presented by MCEETYA in current prices only. It can be noted that in its consideration of the performance of the schools sector the Productivity Commission (2003 p.3.40) uses the NFGDP deflator with the financial data provided by MCEETYA.

ABS National Accounts

The ABS for a long time presented data in the national accounts in current prices and constant prices. The constant price estimates were based on the use of price deflators relevant to the major components of production. In 1997-98 the ABS moved to introduce chain volume measures progressively. The chain volume measure was estimated by deflating the current value by a price index in which the weights were those for the immediate previous year (for a full discussion see ABS 1997, 5248.0). In contrast the previous constant price estimates had been based on price indexes where the weights were those set in a much earlier base year. The ABS adopted this method to minimise the index number biases discussed in section 2 above.

Prior to June 2001 the ABS used an Education Cost Index (ECI) to deflate the expenditures on education in the National Accounts to produce a measure of the volume of output of the education sector. Details of the ECI are shown in Box 3 and discussed further in Appendix 1. As was common across public sector services where much of the product was not sold, *the output was valued at the cost of the inputs*. Note that the wages paid in education were deflated by the award rates payable in the education sector.

From June 2001 ABS has used a measure of volume for education based mainly on physical measures of output (ABS 2001, 5206.0 March, pp.13-18). It uses this measure to adjust the annual dollar value of its measure of output. Student numbers in schools are counted in full-time equivalents. University students are counted in full-time equivalents in eleven discipline groups, weighted by their HECS weights. The research component of output is based on publications and research student completions. Module hours of training are used for vocational education. The volume measure for the remaining areas—pre-school and other education services are derived using input price indexes.

Box 3. The Education Cost Index (ECI)

The Education Cost Index was developed by the ABS for each state and territory for its National Accounts processes. It has wage components and non-wage components.

The wage indexes developed for all states and territories were based on the wage rates of teacher and clerical workers with for some states data on wage rates of cleaners and or miscellaneous workers.

The ABS has recently replaced these award rate in the ECI with the WCI for professional wage and salary earners.

The non-wage indexes produced for the various states and territories vary considerably in their composition but take into account movement in rates for items such as Telecommunications; Industrial Machinery and Equipment; Electricity; Transport and Storage; Furniture and Fixtures; Printing and Services to Printing; Property Rates and Charges; Communication; Rent; Utilities; Stationery; Repairs and Maintenance.

For Australian estimates the state and territory level indexes were combined with weightings reflecting the proportions of their contributions to expenditure for Australia as a whole.

4. Reviewing current methods

This section is concerned with whether the current methods are appropriate to their purposes. The budgetary uses are first considered and then accountability/performance review.

Budgetary purposes

The Commonwealth for macro-economic management needs to estimate the impact of its decisions in relation to the projected size of the GDP. Hence estimates using the NFGDP deflator are appropriate. States and Territories also use non-farm deflator series appropriate to their State Domestic Products.

All governments, in allocating resources, make decisions about funding levels for a large array of services. These decisions about levels address a mix of policy and pricing issues.

Maintaining standards

If it were determined that a particular standard would be maintained then funding would need to be adjusted by the cost of maintaining the standard. This is the policy decision in relation to student assistance and for HECS charges, where the CPI is used⁷. It should be emphasised that if the government adjusts funding according to the NFGDP deflator then it is maintaining its contribution in real terms but it is not maintaining the standard of provision in the sector in real terms if costs in the sector have risen faster than the NFDGP deflator.

If a particular standard of resource provision were to be maintained then it would be appropriate to use an adjustment measure based on the wages of teachers, other personnel and other resources. This was done for the annual allocation for universities for a long period up to 1996. A similar procedure was used for Commonwealth payments to schools up to 1993.

An issue for governments is whether to fully fund pay increases arising from an industrial campaign. One suggestion is that an index for all professional salaries could be used rather than the teachers pay rate, which can be affected by industrial action in a particular sector at a point in time. The issue here is one of policy, not really of indexes. If it were decided to fund on the average pay of all professionals the government policy on standards would then be to 'maintain standards *subject to* funding of pay increases not exceeding the average rise in pay for professional persons'.

If the quality of, say, teaching staff employed improves as a result of the pay rise then using the teaching staff wage index in the deflation will lead to an underestimate of the inputs, and an overestimate of productivity. This is an index number problem: most indexes are affected by quality changes over time and require restructuring to reflect the current inputs.

⁷ The arguments that arise here are fairly minor, within the narrow domain of whether items included in the CPI basket reasonably reflect the items that students purchase

No explicit standard

From 1993 for schools and from 1996 for universities there has not been an explicit attempt to fund a particular standard of provision.

As stated above, since 1993 the Commonwealth's annual adjustment of recurrent funding for schools has been against the AGSRC. Table 2 shows this to have increased by 31 per cent from 1997 to 2002.

Table 2 includes the Wage Cost Index (WCI) for the education sector. The WCI provides a measure of changes in hourly wage and salary costs, unaffected by changes in the composition of the labour force, numbers of jobs, hours worked or changes in characteristics of employees and their career paths. More detail on the WCI is included in Appendix 1. The WCI was developed to overcome the problems in the earnings measures due to changes in the composition of employees or the hours of ordinary time earning.

Average Weekly Earnings increased by 24 per cent in the period 1997 to 2002. Compensation per employee in the education sector, as measured in the National Accounts (ABS 5204.0), increased by 21 per cent. In contrast, the WCI for the education sector increased by 19 per cent.

Table 2 also shows that the NFGDP deflator increased by only 11 per cent and the CPI by 15 per cent. These last two indexes might be taken as rough indicators of the change in non-salary costs. This is considered further below.

To make a rough estimate of how much costs have increased in education an alternative deflator comprising 67 per cent of the WCI and 33 per cent the NFGDP deflator has been prepared. It is shown in the last row of Table 2 and increases by 17 per cent over the period. This is substantially smaller than the 31 per cent increase in the AGSRC.

University operating funds are adjusted by the CAF, which rose by only 10 per cent in the years 1997 to 2002. This is considerably less than the 17 per cent increase in the alternative deflator based on the WCI and NFGDP deflator. As stated explicitly by DEST, the CAF does not measure actual price rises but the Commonwealth's contribution towards annual increases in salary and non-salary costs.

Under the ANTA agreement the Commonwealth real contribution is to be maintained. It appears that this has been at rate a little above the NFGDP deflator but lower than the alternative deflator.

In summary, for Commonwealth payments to schools under States Grants Acts the adjustment method has led to an increase in funds that allow an increase in the teachers and other resources that can be purchased per student in government and non-government schools. At the university level the methods have led to a decline in the real value of the operating grant per student.

What is to be provided for any sector is a matter of government policy. What this discussion has aimed to do is to make more transparent how much of the process represents adjustment for price increases as distinct from implementation of policy.

Table 2: Select price, wage and cost adjustment measures, Australia 1997 to 2002

		1997	1998	1999	2000	2001	2002
WAGE MEASURES							
WCI Education	ABS 6345.0	100.0	103.6	107.1	110.1	114.9	119.1
WCI Professionals	ABS 6345.0	100.0	103.5	107.2	110.3	115.0	119.1
WCI all occupations	ABS 6345.0	100.0	103.2	106.4	109.6	113.5	117.2
Compensation per employee per hour - Education	ABS 5204.0	100.0	104.4	107.4	111.8	116.5	121.1
Compensation per hour – All employees	ABS 5204.0	100.0	103.8	107.4	111.1	116.6	122.5
AWE Adults ordinary time earnings	ABS 6302.0	100.0	104.2	107.2	112.4	118.3	124.5
PRICE MEASURES							
GDP deflator	ABS 5206.0	100.0	100.5	101.1	105.3	109.0	111.5
Non-farm GDP deflator	ABS 5206.0	100.0	100.9	101.7	105.8	108.8	111.4
New Building deflator	ABS 5206.0	100.0	103.5	107.1	110.2	110.9	113.3
CPI	ABS 6401.0	100.0	100.9	102.3	106.9	111.6	114.9
ECI	ABS unpublished	100.0	102.0	105.7	108.3	112.8	116.5
Alternative education deflator	67% WCI Education +33% NFGDP deflator	100.0	102.7	105.3	108.7	112.9	116.6
COST ADJUSTMENT MEASURES							
CAF*	DEST 2003a, b	100.0	101.6	103.2	105.0	107.2	109.7
AGSRC for main State grants school funds	DEST 2003b	100.0	104.6	110.3	118.5	124.3	130.7
Building Price Index	DEST 2003b	100.0	101.4	103.5	104.7	107.0	109.5

Source: as specified in column 2. WCI values for 1997 estimated from September 1997 values

* IESIP and some other schools funding are adjusted by a measure virtually the same as the CAF.

Performance reporting

ANTA and the Productivity Commission use price measures in reporting on performance of the education system. Both use the NFGDP deflator.

The NFGDP deflator is appropriate when trying to estimate the burden of the expenditure on the national or state budget. It is not clear that it is the appropriate measure for performance reporting.

With performance reporting a major aim is to see what has happened to the output achieved for a given level of input. If expenditure on inputs is used (rather than number of teachers and other resources) then it is necessary to put the expenditure into constant prices. This requires ‘own-price’ measures: that is, the labour employed should be re-valued by use of a wage and salary measure and the non-labour resources by price measures relevant to those items.

Productivity changes occur in the economy as a whole so that wage increases can be accommodated without the prices of the goods and services rising commensurately. The result, as indicated in Table 2, is that wage measures usually increase by more than the general level of prices as measured by the NFGDP deflator. It means that the cost of inputs to labour intensive industries tends to grow relative to costs to industry in general.

If we deflate the expenditure on labour by the NFGDP deflator we would be substantially *overestimating the labour input* and underestimating productivity increases. In other words, to use the NFGDP deflator in the analysis of performance is to remove much of the productivity improvement that may have occurred.

To see this, a comparison is given in Table 3 of expenditure per hour of training with two different deflators. With the current method using the NDFGP deflator, the expenditure per hour in 2002 prices was shown to fall from \$15.3 in 1997 to \$12.7 in 2001 and then to rise to \$13.1 in 2002. Under the alternative method of deflation the expenditure in 2002 prices was seen to fall from \$16.0 to \$12.8 and then to increase to \$13.1. This means, assuming constant quality of an hour of training, that productivity per unit of input was 17 per cent higher in 2002 with deflation by the NFGDP deflator but 22 per cent higher under the alternative method.

As shown in the simplified example in Box 4, the use of the deflator that reflects the actual costs of the inputs rather than the NFGDP deflator gives the more accurate indication of what has happened to the inputs.

Table 3. Example: Public recurrent expenditure per publicly funded hour of VET with different deflators, Australia

	1997	1998	1999	2000	2001	2002
Government recurrent expenditure actual prices \$m	3,134	3,207	3,218	3,288	3,460	3,694
NFGDP deflator	89.7	90.5	91.3	94.9	97.6	100.0
INPUT: Government recurrent expenditure \$m 2002 prices	3,492	3,542	3,525	3,464	3,545	3,694
OUTPUT: Total adjusted annual hours curriculum, million	228	243	256	263	280	281
INPUT PER UNIT OF OUTPUT: \$ per adjusted annual hour curriculum	15.3	14.6	13.8	13.2	12.7	13.1
Alternative Deflation						
Alternative deflator: 0.67% WCI and 0.33 NFGDP deflator	85.9	88.1	90.4	93.3	96.8	100.0
ALTERNATIVE MEASURE OF INPUT: Government recurrent expenditure \$m 2002 prices Alternative deflator	3,650	3,639	3,560	3,525	3,573	3,694
ALTERNATIVE MEASURE OF INPUT PER UNIT OF OUTPUT: \$ per adjusted annual hour curriculum	16.0	15.0	13.9	13.4	12.8	13.1

Source: Data on recurrent expenditure and hours from ANTA Annual National Reports; Price measures from sources listed in Table 2.

Box 4. An appropriate index for estimating inputs

The following example uses data from an imaginary education and training initiative which in its second year of operation experiences a 10 per cent increase in inputs, a 4 per cent increase in salary costs and a 2 per cent increase in costs of other resources (e.g. utilities, printing, travel, accommodation).

	<i>Year 1</i>	
Employees (number)	30	
Average salary and oncosts (\$)	100,000	
Total salaries expenditure	3,000,000	
Other resources	10,000	
Average cost (\$) (number of units)	100	
Total other resources expenditure	1,000,000	
Total expenditure in Year 1	4,000,000	
		<i>Increase</i>
	<i>Year 2</i>	<i>%</i>
Employees (number)	33	10.0
Average salary and oncosts (\$)	104,000	4.0
Total salaries expenditure	3,432,000	14.4
Other resources (number of units)	11,000	10.0
Average cost (\$)	102	2.0
Total other resources expenditure	1,122,000	12.2
Total expenditure in Year 2	4,554,000	13.9

The table shows expenditure increases from \$4.000m to \$4.554m. A Laspeyres price index, which compares prices in the second year with prices in the first year with inputs held constant at first year level, can be computed according to the following table.

Laspeyres price index

Expenditure in Year 1 at Year 1 prices	\$4,000,000
Expenditure in Year 1 at Year 2 prices	\$4,140,000
	1.035

With a 10 per cent increase in inputs in the example there was also a price increase of 3.5 per cent (Laspeyres Index of 1.035)

If the commonly used NFGDP deflator had an index value of 1.020 in year 2, the expenditure in year 1 at year 2 prices would be calculated at \$4.080m. The increase in inputs would therefore be computed at 11.6 per cent, whereas they had increased by 10 per cent.

NFGDP deflator		1.020
Expenditure in year 1 at year 2 prices	4,080,000	
Estimated increase in inputs %	4,554,000/4,080,000	11.6%

An example for Commonwealth base operating grants to higher education is given in Table 4. Input per actual EFTSU was measured to increase by 1.5 per cent with the deflator used by DEST but to decline 4.4 per cent with the alternative deflator. Some further detail on this, and also for schools and VET, is given in Burke (2003)

Table 4. Commonwealth base operating grants to higher education institutions, alternative deflation, Australia 1997 to 2002

	1997	1998	1999	2000	2001	2002	<i>Change 1997 to 2002 %</i>
Base operating grant, Actual prices \$m	4,597	4,565	4,663	4,735	4,915	5,075	10.4
DEST Cost Adjustment Factor (CAF)	.91.1	92.6	94.0	.95.7	97.7	100.0	9.7
INPUT: Base grant 2002 DEST prices	5,044	4,931	4,959	4,949	5,029	5,075	0.6
OUTPUT: Actual EFSTU '000	451.5	451.8	457.2	430.3	437.2	447.4	-0.9
INPUT PER UNIT OF OUTPUT	11,172	10,914	10,845	11,502	11,502	11,343	1.5
Alternative Deflation							
Alternative deflator	85.9	88.1	90.4	93.3	96.8	100.0	16.5
ALTERNATIVE MEASURE OF INPUT: Base operating grant	5,355	5,182	5,161	5,077	5,075	5,075	-5.2
ALTERNATIVE MEASURE OF INPUT PER UNIT OF OUTPUT: Base grant per actual EFTSU:	11,861	11,468	11,289	11,799	11,607	11,343	-4.4

Source: Expenditure data from AVCC Funding Tables 2003.

Note: EFTSU is equivalent full-time student unit. The 'base operating grant' is defined by AVCC differently to DEST. It excludes funding for Commonwealth Industry Places Scheme and excludes the capital roll-in.

5. Wage and non-wage measures for the VET sector

A first step is to estimate the share of expenses in the VET sector represented by personnel costs and the share of other costs.

Expenditure patterns in Vocational Education and Training

The NCVER publication, *Australian vocational education and training statistics 2001 Financial data* provides aggregated information on government sourced financial activities in VET for Australia as a whole and for states and territories and ANTA.

Despite the omission of training provision which is not funded from the public purse, the information is a satisfactory basis for estimates of VET current expenditure patterns in Australia. Table 5 shows the proportion of expenses in wage areas and in various non-wage areas.

This five year summary provides a picture of reasonably stable expenditure patterns. Apart from the usual categories of *Employee Costs* and *Supplies and Services* there are large items, termed *Grants and Subsidies* and *Payments to non-TAFE providers for VET delivery*, which transfer funds to 'external' expenders. These funds are to be spent in much the same way as the items listed under employee costs and supplies and services, so for the purpose of this activity they can be allocated to those categories in the existing ratios. This is done in the right hand column.

Depreciation and amortisation are not part of the supplies and services category determined in the NCVER figures. Nevertheless, for the purpose of this activity they are sufficiently akin to supplies and services to be treated as part of that group. The small item 'other' is not defined and has been allocated pro rata to employee costs and supplies and services.

The ratio of wage and salary related expenditure to goods and services expenditure in Vocational Education and Training Australia wide is estimated at 69.5 to 30.5. Note that this is only marginally different to the assumption for the Alternative deflator used above of 67 per cent for wages and 33 per cent for other expenses.

Table 5. Proportions of government sourced VET operating expenses: average 1997–2001

	<i>Proportion of Total Expenditure</i>	<i>Proportion of Total Expenditure: Two Category Basis</i>
	%	%
Employee costs	61.1	69.5
Supplies and services	21.6	24.6
Grants and subsidies	4.6	-
Payments to non-TAFE providers for VET delivery	6.0	-
Depreciation and amortisation	5.9	5.9
Other	0.8	-
Total expenses	100	100

Source: Data from NCVER 2002 and earlier issues Australian VET Statistics, Financial Data.

Wage measures

For the wages element of costs the WCI Education appears to be the best available measure. There are however limitations. The WCI is estimated for the whole education sector and is heavily influenced by schools. And the ABS on the basis of the sample size underlying the estimates is reluctant to provide state level estimates for industry or major occupation.

The issue was raised earlier whether for budgetary purposes governments might use the index for Professionals rather than the Education industry index. In recent time there appears to have been little difference between the changes in the wages paid in the education sector and those paid to all professional salary earners; Table 2 shows that they increased by the same amount from 1997 to 2002.

For universities and VET there are no readily available indexes for comparison with the WCI Education. For school teachers, the Survey of Earnings and Hours (ABS 6306.0) provides information on earnings but only every two years. SHE surveys are not seen as pure measures of pay rates and are affected by compositional changes. In the four years 1998 to 2002 this measure of earnings rose by 15.6 per cent compared with the increase in the WCI Education 14.3 per cent, a fairly similar increase. The earnings and hours survey also provides a combined measure for university and vocational teachers which rose by only 7.9 per cent in the period 1998 to 2002. This seems to be very low, but measures in any year can be affected by the timing of pay agreements in a sector.

As a further and possibly better check on the relevance of the WCI Education to the VET sector data, the agreed rates for TAFE teachers, who are the top of the automatic scale for full-time ongoing teachers, have been examined. These are shown in Table 6 for all states and territories.

Table 6. Average salaries at the top of the unpromoted TAFE teacher classification, 1997 to 2002, \$ per annum

	1997	1998	1999	2000	2001	2002	Change % 1997 to 2002
NSW	48,069	49,755	50,730	52,252	53,551	55,429	15.3
Vic	42,551	43,980	46,576	47,420	51,047	52,579	23.6
QLD	45,536	47,279	49,702	50,554	52,177	53,742	18.0
SA	43,756	45,061	45,811	49,704	50,850	53,400	22.0
WA	48,293	48,293	48,293	48,293	52,416	53,988	11.8
TAS	44,613	46,453	47,465	49,213	51,544	52,916	18.6
NT (Uni)	46,901	48,903	50,558	50,892	51,965	55,087	17.5
ACT	47,758	49,565	49,934	50,683	52,075	53,508	12.0
Australia	45,946	47,430	48,911	50,157	52,290	54,057	17.7
Index	100.0	103.2	106.5	109.2	113.8	117.7	
WCI							
Education	100.0	103.6	107.1	110.1	114.9	119.1	

Source: Teacher salary data supplied by the Australian Education Union; WCI from ABS

There are apparent differences in the growth over time among the states and territories though the timing of new agreements can be a factor in this. The average increase for Australia as a whole for 1997 to 2002 is 17.7 per cent compared with the increase in the WCI of 19.1 per cent.

Further work on this is needed. However, on the evidence so far considered it may be reasonable to assume that wages per hour in VET are more closely aligned to the WCI for Education than to other available indexes.

Non-wage measures

The non-wage component could as a first approximation be deflated by the NFGDP deflator or even by the CPI.

The CPI comprises a number of separate components and these can be used to provide deflation of separate elements of the supplies and services parts of VET expenses. There are also items of the Producers Price Indexes that seem appropriate. Table 7 shows the proportions of the VET supplies and services in particular areas.

It is proposed that the subgroups be averaged assuming equal weights to the subgroups and combined according to the weights of the *Supplies and Services* components they represent. Three components are represented by a Producer Price Index (6427.0). Detail of the sorts of expenditure incorporated in the subgroups can be found in Appendix 1.

Box 5. Be cautious of price indexes for rapidly improving technology

If you bought a top of the line computer tomorrow you would probably pay the same as you would have for the top of the line model two years ago. The quality of the machine you buy tomorrow for the same money will be much better than the one you bought two years ago: more and better memory, much faster, vastly increased data storage.

This creates a problem for index developers who set out to compare prices from year to year for items of exactly the same quality. The machine you bought two years ago would have to be compared to a machine from tomorrow with the same memory, clock speed, storage and so on. This would be a much cheaper machine and it would therefore appear that price indexes for computers are decreasing. Seems obvious, doesn't it? We all know the costs of communications technology are falling, what's to be cautious of?

If a price index is used to project funding needs for computers it will lead to a reduction in funding levels. However, computer users depend on improving their productivity, which comes with ongoing increases in computer quality, so they need to maintain or even increase their funding levels.

Price indexes can be misleading for commodities or services that are becoming cheaper at the same time as they are increasing in quality. This is particularly the case when enhanced productivity is the impetus to improve quality.

Table 7. VET supplies and services components and the CPI subgroups chosen to reflect them

<i>VET Expenditure: Supplies and Services components</i>	<i>Average Weight 1997-01 %</i>	<i>CPI (6401.0) Subgroup</i>	<i>Other Indexes</i>
Consumables	23.0	Furniture and Furnishings Household appliances, utensils and tools Household supplies	
Communications and energy	10.6	Communications Audio, visual and computing Utilities	
Rent and leasing	4.2	Rents	
Contracted services	17.2		6427 Business Services 6427 Output of non-residential and residential building construction
Repairs and maintenance	7.7		
Travel and transfer	4.5	Private motoring Urban Transport fares Holiday travel and accommodation	
Other	11.3	Books, newspapers, magazines Insurance Services	
Depreciation and Amortisation	21.5		6427 Output of General Construction Industry
Total supplies and services	100.0		

Table 8 shows the indexes for the separate components. Overall the combined index for goods and service is shown to increase about 11 per cent in the period considered. However there are some quite different movements among some of the components. The most notable item is insurance services where an increase of over 50 per cent occurred. Against that, there was a 30 per cent decline for Audio–visual and computing. Repairs and maintenance had slightly below average cost increases.

Table 8. VET Supplies and Services Expenditure Component: CPI subgroups and other index series

<i>Supplies and Services</i>	<i>Average Weight 1997-01 %</i>	<i>CPI (6401.0) Subgroup and Other Indexes</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>
Consumables	23.0	Furniture and Furnishings	91.6	93.1	93.3	95.4	98.6	100.0
		Household appliances, utensils and tools	99.2	99.0	99.0	99.1	101.3	100.0
		Household supplies	93.6	94.3	94.4	93.5	97.1	100.0
			94.8	95.5	95.6	96.0	99.0	100.0
Communications and energy	10.6	Communications	99.5	98.6	92.8	95.0	97.5	100.0
		Audio, visual and computing	130.2	127.7	117.2	106.6	104.2	100.0
		Utilities	86.8	86.6	86.5	90.9	96.1	100.0
			105.5	104.3	98.8	97.5	99.2	100.0
Rent and leasing	4.2	Rents	86.8	89.5	91.8	94.7	97.7	100.0
			86.8	89.5	91.8	94.7	97.7	100.0
Contracted services	17.2	6427 Business Services		88.8	91.3	94.2	97.1	100.0
				88.8	91.3	94.2	97.1	100.0
Repairs and maintenance	7.7	6427 Output of non-residential and residential n.e.c. building construction		92.7	95.1	97.4	97.2	100.0
				92.2	95.3	98.1	96.6	100.0
				92.5	95.2	97.7	96.9	100.0
Travel and transfer	4.5	Private motoring	90.3	88.6	89.9	96.5	99.0	100.0
		Urban Transport fares	80.5	81.8	84.3	90.8	97.7	100.0
		Holiday travel and accommodation	80.4	82.4	85.7	87.7	89.7	100.0
			83.7	84.3	86.7	91.7	95.5	100.0
Other	11.3	Books, newspapers, magazines	77.9	81.9	85.2	90.7	96.5	100.0
		Insurance Services	61.5	64.1	67.9	86.3	94.8	100.0
			69.7	73.0	76.5	88.5	95.7	100.0
Depreciation and Amortisation	21.5	6427 Output of General Construction Industry		90.1	93.1	96.6	96.9	100.0
				90.1	93.1	96.6	96.9	100.0
Total supplies and services	100.0		90.1	90.6	91.9	95.1	97.5	100.0

Combined VET index

The series representing goods and services is combined with the series represent the employee costs component in the ratio of the expenditure weights identified in the earlier analysis of VET expenditure. Employee Costs were found to be 69.5 per cent, and supplies and services costs, 30.5 per cent of total VET expenditure. Table 9

shows the proposed index for VET expenditure as the result of combining the employee cost and goods and services cost series in the determined ratio. The indexes are shown with 1997=100 to be comparable to Table 2 above.

Table 9. Overall index for government sourced VET expenditure

VET Expenditure components	Five Year Average Weight 1997-01	1997	1998	1999	2000	2001	2002
Wages component	69.5%						
Wage Cost Index Education		100.0	103.6	107.1	110.1	114.9	119.1
Total supplies and services component, as estimated	30.5%	100.0	100.5	102.0	105.5	108.2	111.0
Combined Index		100.0	102.7	105.5	108.7	112.9	116.6

It can be noted that the estimated index for supplies and services increased only slightly more than the NFGDP deflator, shown in Table 2. The overall combined index increased by slightly less than 17 per cent, almost the same as the alternative deflator presented in Table 2. The underlying factor is that both indexes have the WCI as their principal component.

6. In conclusion

This paper has reviewed the uses of price indexes in education. The major purposes are for adjustment of budgets and for performance review.

The adjustment of budget is a matter of government policy and so too is whether any index is used. However, for transparency, it is desirable that information also be available on how the costs of inputs have changed so that policy changes can be distinguished from price changes.

The paper considered the various uses of indexes made by the Commonwealth and national agencies in relation to their funding of education and training. A range of different approaches, with important consequences for funding in different sectors, are in use.

For the purposes of performance reporting the appropriate measure is one reflecting the costs of inputs in the sector rather than the NFGDP deflator.

The major indexes available for estimating price changes in the education sector and VET in particular were considered. The WCI for Education is considered the most appropriate for the wage component of costs, though school teacher wages would tend to have a large influence on this index. Further checking of its validity for VET and Higher Education is needed.

A first step is a simple comparison with changes in agreements in major universities and TAFE institutions over the last five years. This has been done for the VET sector where the estimated increase in TAFE teachers' salaries for the largest category of teachers was only a little less than the increase in the WCI Education for the period 1997 to 2002.

For the non-wage component the NFGDP deflator can be used. The availability of indexes for the sub-components of the CPI and some relevant Producer Price Indexes made it possible to construct an index for the non-wage components of VET expenses. This has more apparent validity than the NFGDP deflator as its components roughly match the components of VET expenses. The fact that it increased at much the same rate as the NFGDP deflator suggests that little is lost in using the NFGDP deflator. However this is not to say that the movements will be so close in the future. It is clear that quite a few components of the measure for non-wage expenses, such as insurance and computing, move quite differently. This suggests that for purposes requiring greater precision it is worth persisting with the supplies and services index as developed in this paper.

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Appendix 1. Review of selected price measures and their limitations

The Education Cost Index

The Education Cost Index was developed consistent with National Accounts processes and has two main components:

- a wage component; and,
- a non-wage component,

which are then combined to an overall index.

In each state and territory a composite wage index and a composite non-wage index had been used based on appropriate state level wage and non-wage indices to represent the expenditure patterns in the particular field. In both the wage and the non-wage index the component elements were weighted to represent the contributions they make to overall expenditure.

The wage indices developed in all states and territories were based on the wage rates of teacher and clerical workers with some states also incorporating wage rates of cleaners and or miscellaneous workers. However the ABS has recently replaced these award rate data with sector estimates for the Wage Cost Index (WCI) discussed below.

The non-wage indices produced for the various states and territories vary considerably in their composition, but take into account movement in rates for items such as Telecommunications; Industrial Machinery and Equipment; Electricity; Transport and Storage; Furniture and Fixtures; Printing and Services to Printing; Property Rates and Charges; Communication; Rent; Utilities; Stationery; Repairs and Maintenance.

In each state and territory an overall index was developed comprising wage and non-wage indices weighted to reflect the proportions of the two elements in overall expenditure. For Australia as a whole, the state and territory level indices were combined with weightings reflecting the proportions of their contributions to expenditure for Australia as a whole. Because states and territories vary in the relative amounts they spend on wage and non-wage purposes they had different weightings for their contributions to the Australia level wage, non-wage and overall indices.

Currently ABS is using the Wage Cost Index for the wage component of the ECI and as a consequence of sampling methods increasing standard errors of measurement over previous approaches, figures are produced for Australia as a whole, but not for states and territories. These changes are naturally reflected in the non-wage side of the ECI as well.

Limitations

The ECI has always been heavily biased towards schools and schooling, and is more so under the new methodology which uses the Wage Cost Index (6345.0) 'professional' classification in calculating its wage component. The 'professional' classification is influenced by teachers and other professional groups and is less

appropriate for application in vocational education and training and university situations, particularly where specialist, rather than generalist activities are the norm. It needs to be kept in mind that the ECI is now an index for Australia as a whole rather than a weighted combination of states and territories.

Wage Cost Index and the Labour Price Index

The Wage Cost Index (WCI) provides a measure of changes in hourly wage and salary costs in the Australian labour market, unaffected by changes in the composition of the labour force, numbers of jobs, hours worked or changes in characteristics of employees and their career paths. Wages and salaries account for the majority of expenditure on labour costs.

Wages and salaries refer to cash payments to employees and include ordinary time earnings, overtime earnings, and bonus payments, together with the value of any salary sacrificed. Other forms of cash and non-cash remuneration such as superannuation, private health cover, share options, travel allowances, and penalty payments are excluded.

Four quarterly series are published in *Wage Cost Index, Australia* (6345.0) combining: ordinary time earnings; overtime earnings; and bonus payments made to employees. Each of the four index series is compiled for various combinations of State/Territory, sector (private/public), broad industry group and broad occupation group.

The WCI is a chain Laspeyres price index which is reviewed annually, but its reference is unusual as the reference base (as opposed to the weighting base) is currently September quarter 1997, the first quarter in which the sample of information was collected to calculate WCI.

A large proportion of the change in the total price of labour services relates to wages and salaries paid to job occupants, which is measured by the WCI. However, to consider the total price paid for labour services, measures of non-wage items are required. These items include paid leave, employer funded superannuation, payroll tax, workers' compensation, fringe benefits and fringe benefits tax. *The Labour Price Index* (LPI), formerly referred to as the Labour Cost Index (LCI), will measure changes in the price paid for labour services inclusive of wages and salaries and non-wage items. When developed, the LPI will produce movements covering the broader concept of the price of labour services. Collection of the LPI commenced from the September quarter 2001 and publication will commence in 2003.

The base level unit of the WCI is known as an Expenditure Aggregate (EA), a weighted set of wage costs for a group of similar jobs. EAs are aggregated up to State/Territory, sector (private/public), broad industry group and broad occupation groups. The EA expenditure weights, which are used to combine EA indices into aggregates (publication indices), are derived from independent estimates of total weekly wages and salaries according to the relative importance of each elementary aggregate based on employers' total expenditure on wages and salaries. These weights are derived as the product of EA average weekly earnings estimates and EA employee counts. Average weekly earnings estimates are derived from employment and earnings data at the State by sector by industry level from the quarterly Survey of Employment and Earnings (SEE), and employment and earnings data at the sector by

industry by occupation level from the biennial Employee Earnings and Hours (EEH) survey. Employee counts by State by sector by industry by occupation are obtained from the Census of Population and Housing.

Limitations

There is a major limitation to the WCI in that it is provided for major industry and for major occupation groups and states and territories. There is no separate index for schools and TAFE and higher education⁸. Currently a more critical limitation for WCI is that it addresses movement in wages, but not the full costs of labour, which include non-wage components such as superannuation. ABS is addressing this problem and the new Labour Price Index (LPI) series is expected to come on line during 2003 (see above).

Consumer Price Index (CPI)

The CPI was specifically designed as a general measure of price inflation for the household sector as a whole. It measures changes in the prices of a 'fixed' basket of goods and services acquired by household consumers in all metropolitan private households. The CPI is a fixed-weighted index, which has a current reference base period of 1989–90. Separate CPIs are calculated for the metropolitan areas in each of the states and territories of Australia, and for Australia as a whole by aggregation with appropriate weightings.

The composition of the CPI basket is based on the pattern of household expenditure in the 'weighting base period', which is 1998–99 for the current series. Information on the spending habits of Australian households was obtained in the Household Expenditure Survey (HES) conducted by the ABS and the results provide the starting point for selecting the basket of goods and services to be priced for the CPI.

The total basket is divided into 11 major groups, each representing a specific set of commodities:

- Food
- Alcohol and tobacco
- Clothing and footwear
- Housing
- Household furnishings, supplies and services
- Health
- Transportation
- Communication
- Recreation
- Education
- Miscellaneous

⁸ The ABS survey of *Employee Earnings and Hours* (6306.0) does provide a snapshot of Average Weekly Total Earnings for 24 Education Professionals and for 241 School Teachers and 242 University and Vocational Education Teachers and 249 Miscellaneous Education Professionals. However the survey is a biennial one and university teachers remain combined with vocational teachers.

The ABS publication *A Guide to the Consumer Price Index* (6440.0) explains that these groups are in turn divided into 34 subgroups, and the subgroups into 89 expenditure classes. ‘All Groups’ is the highest level of the index. Expenditure classes are groups of similar goods or services and they are the lowest level at which indices are published and weights are fixed. Elementary aggregates are the basic building blocks of the CPI and each contains several prices for a particular good or service. There are approximately 1,000 elementary aggregates in each capital city. About 100,000 price observations are collected each quarter across the capital cities.’

The group known as ‘Education’ makes a small 2.69 per cent contribution to ‘All Groups’ CPI. There is only one sub-group in education and it comprises three expenditure classes: Preschool and primary education (0.50 per cent); Secondary education (0.94 per cent); and, Tertiary education (1.25 per cent). The items for which price changes are compiled in the three expenditure classes are: preschool and primary education—private and government preschool and primary education fees; secondary education—private and government secondary education fees; tertiary education—private and government tertiary education fees.

Limitations

Clearly, ‘All Groups’ and ‘Education’ CPIs have limited application as price deflators in the field of education as their focus is on household consumption of education services. In particular, the ‘Education’ component of CPI is concerned with fees and related school and higher education costs to households and does not reflect the costs of educational provision. On the other hand, indices for CPI groups and subgroups, singularly or combined, because they reflect price movements in important areas of consumption, for instance computers and communications, have application as parts of combination indices.

The method for calculating CPI uses price information from the eight capital cities of the Australian states and territories. It is really a metropolitan index which has been found satisfactory in most circumstance, but sometimes its city nature will need to be kept in mind.

An obvious proper use of the CPI in education is in estimating the real value of student assistance. It also has relevance in the cost to students of the fees paid in education and training under HECS or under full-fee payments.

Survey of Average Weekly Earnings (SAWE)

This survey is conducted quarterly and reported quarterly in ABS 6302.0 *Average Weekly Earnings Australia*. Reports are at ANZSIC industry level, which has one ‘Education’ category, but nothing below that level. Occupation is not addressed in this survey. The publication notes that other information is available on request and provides the following variable list

The 6302.0 publication notes that the more variables included in any one tabulation the more likely it is that confidentiality provisions associated with the data will be invoked and some data will therefore have to be suppressed.

<i>Type of estimate</i>	Original Seasonally adjusted Trend
<i>Composition of earnings</i>	Full-time adult ordinary time earnings Full-time adult total earnings All employees total earnings
<i>States and territories</i>	New South Wales Victoria Queensland South Australia Western Australia Tasmania Northern Territory Australian Capital Territory
<i>Sector</i>	Private sector Public sector
<i>Sex</i>	Males Females Persons
<i>Industry (ANZSIC classification)</i>	ANZSIC Division (1-digit code)—as shown in table 10 ANZSIC Subdivision (2-digit code) ANZSIC Group (3-digit code) ANZSIC Class (4-digit code)

Limitations

This index has a broad spectrum coverage of education only; with no occupational classification and only the one industry classification covering the whole of education, primary, secondary and the various components of further and higher education. Like the Wage Cost Index, this survey does not address movements in non-wage costs of labour.

Survey of Employment and Earnings (SEE)

This survey is conducted quarterly and reported quarterly as 6248.0 *Public Sector Wage and Salary Earners Australia*.

Reports are at ANZSIC industry level which includes 'Education' as a category. SEE now collects quarterly employee earnings for the public sector as one of the inputs for estimating GDP for the Australian National Accounts. Further detail may be obtained from ABS and the following variable list is provided.

Employees	Persons, available by mid-month of each quarter (previously available by month until December 2001). Full-time/Part-time (available until November 2001, and only by mid-month of quarter)
Gross earnings (available by quarter)	Gross wages and salaries, severance, termination and redundancy payments. Fees paid to directors and office holders
Sector	Private sector (available until December 2001) Public sector
Level of government	Commonwealth government State government Local government
Public institutional sector (SISCA)	Public trading enterprises Public financial enterprises General government
Sex	Males/females (available until May 1996, and only by mid-month of quarter)
Industry (ANZSIC classification)	ANZSIC Division (1 digit code as shown in this publication); ANZSIC Sub-division (2-digit code) ANZSIC Group (3-digit code); ANZSIC Class (4-digit code)
Employer unit size	Any user specified range (e.g. Under 20employees; 20–49 employees; 50–99 employees) Ranges can overlap and do not have to cover the complete range

Limitations

SEE (6248.0), because of the nature of its survey, does not provide information that can readily be related to other series of similar information.

As with Average Weekly Earnings, this index has a broad spectrum coverage of education only; with no occupational classification and only the one industry classification covering the whole of education, primary, secondary and the various components of further and higher education. As well, this survey does not address movements in non-wage costs of labour.

Survey of Employment Earnings and Hours (SEEH)

This survey is conducted biennially and published biennially as 6306.0 *Employee Earnings and Hours Australia*.

SEEH uses ASCO and has the Sub-major group *Education Professionals* and the minor groups *School Teachers*, *University and Vocational Education Teachers* and

Other Teachers and Instructors. The ASCO minor group *Education Managers* is excluded.

Data collected according to the ASCO classification should, in the minor groups, be further subdivided to *Primary Teachers* and *Secondary Teachers* and to *University Lecturers* and *Vocational Education Teachers* but this information is not published and is not readily available. It is suggested that more detailed information is available on request, but unit group level data is not published, presumably for reasons related to standard errors.

Limitations

Because this series provides both industry and occupation data of importance to education it has obvious attractions. Unfortunately, being a biennial survey, its use is severely compromised. If the series were collected and published more frequently, the critical variables for our purposes would be:

<i>Industry (ANZSIC classification)</i>	Division (1-digit codes) Subdivision (2-digit codes)
<i>Occupation (ASCO Second Edition)</i>	ASCO Major group (1-digit codes); ASCO Sub-major group (2-digit codes); ASCO Minor group (3-digit codes); ASCO Unit Group (4-digit codes)

That is, it would provide more detailed level information for education as an industry and an occupation.

This survey suffers from some problems in relation to classification of managerial and non-managerial personnel. The concept of managerial/non-managerial status in this survey differs from the ASCO classification ‘Managerial and Administrative’ staff also used in the survey.

Employee earnings, Benefits and Trade Union Membership Survey

This survey is conducted annually as a supplement to the August monthly Labour Force Survey (LFS) and published as 6310.0 *Employee Earnings, Benefits and Trade Union Membership*.

Occupation and industry information is published only at the major group level. Occupation data are classified according to *ASCO — Australian Standard Classification of Occupations, Second Edition* (cat. no. 1220.0).

- Managers and administrators
- Professionals
- Associate professionals
- Tradespersons and related workers
- Advanced clerical and service workers
- Intermediate clerical, sales and service workers
- Intermediate production and transport workers
- Elementary clerical, sales and service workers
- Labourers and related workers

Industry data are classified according to Australian and New Zealand Standard Industrial Classification (ANZSIC), 1993 (cat. no. 1292.0).

- Agriculture, forestry and fishing
- Mining
- Manufacturing
- Electricity, gas and water supply
- Construction
- Wholesale trade
- Retail trade
- Accommodation, cafes and restaurants
- Transport and storage
- Finance and insurance Communication services
- Property and business services
- Government administration and defence
- Education
- Health and community services
- Cultural and recreational services
- Personal and other services

It is noted that breakdowns of some of the data items is possible, but which is not specified.

Limitations

This is an annual survey, which is an unfortunate limitation on what would otherwise be an attractive index because it uses both occupation and industry classifications. The survey is revised every five years after annual census which means that it may be insensitive to considerable weighting/volume changes. Estimates of weekly earnings from this survey may not appear consistent with those from the Survey of Average Weekly Earnings (ABS 6302.0).

Producer Price Indexes

This is actually a mixed suite of input and output indexes, which is published quarterly in the publication *Producer Price Indices* (ABS 6427.0). The indices are presented in a 'stage of production' framework as well as a major industries framework.

The indices are fixed weighted indices of the Laspeyres form. The list of items and the weights are updated periodically to ensure they remain representative. New index series compiled using updated weights are linked to the previous series to maintain a continuous series. Broad level weights are derived from an analysis of the latest available input-output tables as well as other ABS and industry sources.

The main sources of ongoing price data are samples of businesses. They can relate to either buyers or sellers, or a combination of both, choice being influenced by the pricing point of the index (output or input) and other practical considerations.

The pricing methodology is specification pricing, in which a manageable sample of precisely specified products is selected for repeat pricing. Care is taken to ensure that products are fully defined in terms of their transaction prices.

When the quality or the specifications of an item change over time, adjustments are made to the reported prices so that the index captures only pure price change. This technique is known as pricing to constant quality.

Industry classifications are in terms of ANZSIC. The Stages of Production concept (SOP) has three components, preliminary, intermediate and final and is held to be flexible so that a particular product can be classified in two stages depending on its place in a particular production process. GST is excluded from all indices in this suite.

The suite of indices is presented in five sub-suites:

- Stage of Production;
- Manufacturing Industries;
- Construction Industries;
- Mining Industries;
- Service Industries.

Further sub-divisions are available within the sub-suites, some of which are likely to be useful in developing compound indices for special purposes such as in the training industry.

Limitations

This is a relatively new (1998/99) suite of indices and, while it appears to have considerable potential for use in vocational education and training, it has not been much investigated by education industry users.

Care must be exercised in using this suite as it comprises input and output indices for the same areas of industry. Input indices measure movements in prices paid by the industry for materials and other inputs; output indices measure movement in prices charged by the industry. For instance, for the construction industry, which is of interest to vocational education and training, there is an input index concerned with the prices paid by the industry for materials and other inputs and an output index concerned with the prices charged by the construction industry. The latter is usually the index of concern to education.

These indices also use a new 'stages of production' (SOP) concept. There are three stages to the concept, preliminary, intermediate and final, but there appears to be some ambiguity in allocation to these categories

Appendix 2. Selected CPI Groups, Sub-Groups and Expenditure Classes

HOUSING GROUP		
<i>Subgroup</i>	<i>Expenditure Class</i>	<i>Description</i>
Rents	Rents	Rent paid to private and government landlords, including housing authorities, Defence Housing Authority
Utilities	Electricity	Electricity charges and connection fees
	Gas and other household fuels	Mains and bottled gas, and connection fees, firewood, heating oil, charcoal, and coal
	Water and sewerage	Water supply and sewerage charges
Other housing	House purchase	New homes (excluding land) and major improvements to existing homes and fixed appliances such as ducted heating, hot water systems
	Property rates and charges	State and local council property based rates and charges except water and sewerage
	House repairs and maintenance	Materials and labour costs for repairs and maintenance to dwelling
HOUSEHOLD FURNISHINGS, SUPPLIES AND SERVICES		
<i>Subgroup</i>	<i>Expenditure Class</i>	<i>Description</i>
Furniture and furnishings	Furniture	All household furniture (including outdoors), lamps, ornaments and blinds
	Floor and window coverings	All floor and window coverings and ceramic and vinyl tiles
	Towels and linen	Bathroom, bedroom, table and kitchen linen, blankets, pillows
Household appliances, utensils and tools	Major household appliances	Purchase and hire of all major 'white' goods not permanently fixed such as refrigerators and washing machines
	Small electric household appliances	Purchase and hire of smaller electrical appliances such as toasters and vacuum cleaners
	Glassware, tableware and household utensils	Dinner sets, cutlery, stoneware, steak knives, pots, pans, cookware, brooms, and mops
	Tools	Lawnmowers, garden tools, electric drills and paint brushes
Household supplies	Household cleaning agents	Laundry soaps and powders, bleach, disinfectants and polishes
	Other household supplies	Other items used in households, including toilet paper, insect repellent, garbage bags and aluminium foil
Household services	Household services	Includes house cleaning, lawn mowing, gardening and pest control services, furniture removal and storage, non-postal delivery charges
TRANSPORTATION		
<i>Subgroup</i>	<i>Expenditure Class</i>	<i>Description</i>
Private motoring	Motor vehicles	Purchase and long term hire/lease of new cars and motor cycles
	Automotive fuel	Leaded and unleaded petrol, diesel
	Motor vehicle repair and servicing	Crash repairs, panel beating, tune ups and maintenance
	Motor vehicle parts and accessories	Separately purchased parts and accessories, motor oils and tyres
	Other motoring charges	Registration fees, parking fees, driving lessons, tollway charges
Urban transport fares	Urban transport fares	Bus, train, ferry, tram and taxi fares, not for holiday travel

COMMUNICATION		
Subgroup Communication	Expenditure Class Postal Telecommunication	Description Envelopes, stamps and postal delivery charges Local and long distance calls, mobile phone services and connection fees and internet services
RECREATION		
Subgroup Audio, visual and computing	Expenditure Class Audio, visual and computer equipment Audio, visual and computing media and services	Description Equipment including televisions, videos, computer hardware and stereos Media including blank and pre-recorded cassettes, CDs, computer software, photographic film, all forms of stationery, and services such as film developing, pay television
Books, newspapers, magazines	Books	Fiction, non fiction, hardback and paperback
Holiday travel and accommodation	Newspapers and magazines	Newspapers, comics, magazines and catalogues
	Domestic holiday travel and accommodation	Air, sea and rail travel, car hire, hotel and motel accommodation and package charges for holidays in Australia
	Overseas holiday travel and accommodation	Air, sea and rail travel, car hire, hotel and motel accommodation and package charges for holidays overseas
MISCELLANEOUS		
Subgroup Insurance Services	Expenditure Class Insurance Services	Description Comprehensive insurance for dwellings and motor vehicles, compulsory third party motor vehicle insurance services



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